

# Space Qualified, Radiation Hardened, Dense Monolithic Flash Memory, Phase II

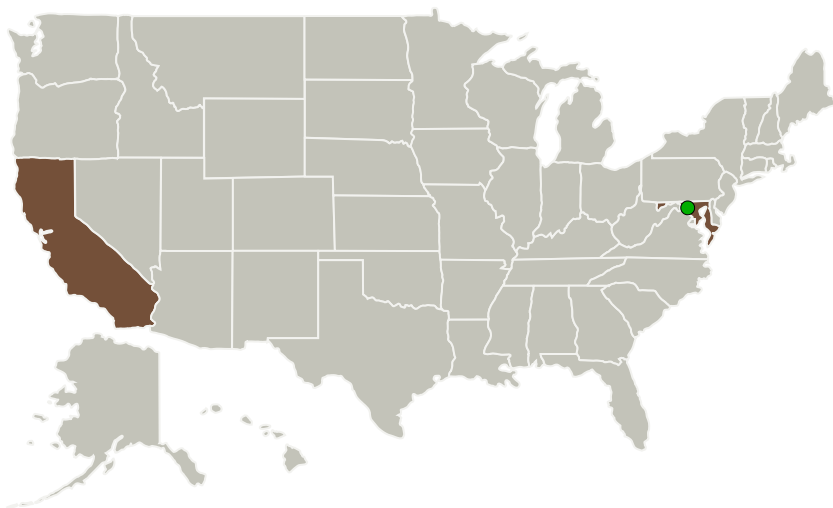
Completed Technology Project (2011 - 2013)



## Project Introduction

Space Micro proposes to build a radiation hardened by design (RHBD) flash memory, using a modified version of our RH-eDRAM Memory Controller to solve all the single event effects issues (SEU, SEFI and multiple bit errors) using either a RHBD process with NAND Flash cells. The RH-eFlash will be manufactured on known radiation characterized ASIC processes: examples being 130 nm or 65 nm TSMC or other US foundry equivalents. Using the TSMC example, the resulting RH-eFlash, fabricated on a 65 nm process, provides 512 Mbit to 1 Gbit of radiation hardened (SEU, SEFI, SEL and TID) NAND Flash memory. Operating temperature and packaging reliability is addressed through a thorough memory integrated circuit design (temperature) and post IC high-reliability package selections (i.e. ceramic packages). Note that this technology is portable to future available and radiation tested ASIC processes with even finer geometries and high density.

## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Space Micro, Inc.	Lead Organization	Industry	San Diego, California
 Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland



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## Primary U.S. Work Locations

California

Maryland

## Project Transitions



**July 2011:** Project Start



**October 2013:** Closed out

**Closeout Summary:** Space Qualified, Radiation Hardened, Dense Monolithic Flash Memory, Phase II Project Image

### Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/139358>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Space Micro, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

### Principal Investigator:

David R Czajkowski

### Co-Investigator:

David Czajkowski

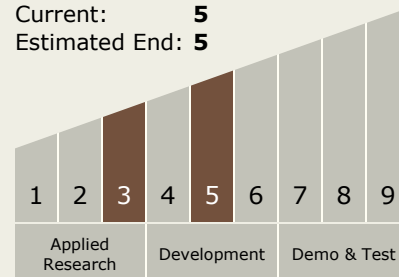
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## Technology Maturity (TRL)

Start: **3**  
Current: **5**  
Estimated End: **5**



## Technology Areas

### Primary:

- TX02 Flight Computing and Avionics
  - └ TX02.1 Avionics Component Technologies
    - └ TX02.1.1 Radiation Hardened Extreme Environment Components and Implementations

## Target Destinations

Earth, The Moon, Others Inside the Solar System, Outside the Solar System, The Sun, Mars